Name: _____ Date: _____

Student Exploration: Plants and Snails

Vocabulary: bromthymol blue (BTB), indicator, interdependence

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

1. What important gas do we take in when we breathe?

   _____

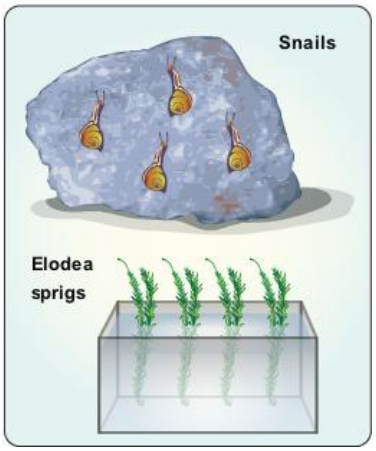
2. Why don't we run out of the important gases that we need to stay alive?

   _____

   _____

Gizmo Warm-up

In the *Plants and Snails* Gizmo™, each of the test tubes contains water and a small amount of **bromthymol blue** (BTB). BTB is a chemical **indicator**. An indicator changes color when the chemicals in the water change.



1. With the lights set to **on**, drag a snail into one test tube and a plant into another. Press **Play** ( ). After 24 hours, what is the color of each tube?

   _____

   _____

2. Select **Show oxygen and CO_2 values**. Place the **O_2/CO_2 probe** in each tube. The probe will show you the levels of two gases, oxygen (O_2) and carbon dioxide (CO_2), in the tubes. We call these amounts the *gas levels*.

   A. When the water turns blue, which gas is most common? _____

   B. When the water turns yellow, which gas is most common? _____

   C. What does it tell you when the water is green? _____

      _____

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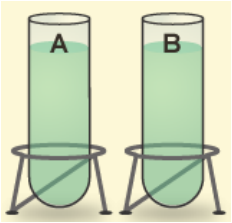
Activity A: **Gases in and gases out**	Get the Gizmo ready: • Click **Reset** ( ). • Clear all of the test tubes. • Turn on **Show oxygen and CO_2 values**.	

Question: What gases do plants and animals take in and what do they give off?

1. Collect data: Use the Gizmo to learn what gases plants and animals take in and give off. Try it in both light and dark. Record your results below. If you do more than five experiments, write your extra results in your notebook or on separate sheets of paper.

What is in the tube	Lights: on/off	Results

2. Analyze: Study your data on gases given off by plants.
   A. What gas do plants give off in the light? _____
   B. How about in the dark? _____

3. Analyze: Study your data on gases given off by animals.
   A. What gas do animals give off in the light? _____
   B. How about in the dark? _____
   C. How do these results compare to your plant results? _____

   _____

4. Extend your thinking: What do you think would happen if plants and animals were put in the same test tube? Explain your thinking. Then test your prediction in the Gizmo.

   _____

   _____

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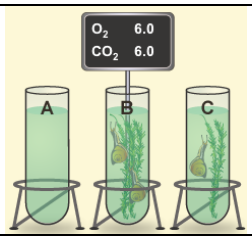
Activity B: **Interdependence**	Get the Gizmo ready: • Click **Reset**. • Clear all of the test tubes. • Turn the light switch to **on**. • Check **Show oxygen and CO_2 values**.	

Question: How do plants and animals depend on each other?

1. Observe: Put one sprig of Elodea and one snail in a test tube with the lights **on**. Click **Play**.

   A. Does the color of the water in the tube change? _____

   B. What happens to the O_2 and CO_2 levels? _____

   _____

2. Predict: Without using the Gizmo, predict what you think will happen to the gas levels in each case listed below. (Leave the **Actual result** column blank for now.)

Tube	Prediction	Actual result
2 snails, 2 sprigs, lights on		
1 snail, 2 sprigs, lights on		
1 snail, 2 sprigs, lights off		

3. Run Gizmo: Now run the Gizmo to test your predictions. Record your findings in the table.

4. Generalize: Describe how plants and animals each contribute to the survival of the other. (This type of cooperative relationship is called **interdependence**.)

   _____

   _____

5. Challenge: Simulate a 24-hour day (12 hours of light, 12 hours of dark). How many snails and plants do you need to keep a stable environment? Explain any discoveries you make.

   _____

   _____

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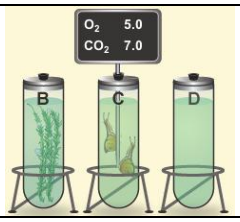
Activity C: **Linking O_2 and CO_2**	Get the Gizmo ready: • Click **Reset**. • Clear all of the test tubes. • Turn the light switch to **on**. • Check **Show oxygen and CO_2 values**.	

Question: How are the amounts of oxygen and carbon dioxide related to each other?

1. Observe: Put two Elodea sprigs into a test tube. Put the **O_2/CO_2 probe** into the tube with the Elodea. Click **Play**. As the Gizmo runs, **Pause** ( ) it a few times.

   A. How do the oxygen (O_2) and carbon dioxide (CO_2) levels change over time?

   _____

   B. What is always true about the *total* amount of O_2 and CO_2 in the test tube?

   _____

   C. What happens when the CO_2 reaches zero? _____

   _____

2. Revise and repeat: Click **Reset** and run the experiment again, this time with the lights **off**.

   A. How do the gas levels change? O_2 _____ CO_2 _____

   B. What is the total of O_2 and CO_2? _____

3. Revise and repeat: Click **Reset**. Remove the plants. Repeat the experiment with two snails.

   A. How do the gas levels change? O_2 _____ CO_2 _____

   B. What is the total of O_2 and CO_2? _____

   C. Why do the gas levels stop changing in this case? _____

   _____

4. Challenge: The total of the O_2 and CO_2 in the test tubes always stayed the same. Why do you think this is? (Hint: Molecules of carbon dioxide, CO_2, are made of carbon, C, bonded together with two molecules of oxygen, O.)

   _____

   _____

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